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February 4, 1957

25X1

Reference: Contract ND-107  
Task Order #

25X1

Dear Sir:

In accordance with Article 4 of the contract, we wish to report that the 8% expenditure point of the estimated costs of the referenced Task Order was reached at December 31, 1956.

At the present time we have no indication that funds beyond our authorization will be required to successfully complete this program.

Very truly yours,

25X1

Contract Administration

75/36

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Monthly Letter Report No. 6

on the

Radio Circuit Development Program

*file RD107  
TO #4*

Period:

January 1, 1957 - February 1, 1957

Reference:

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**I. Personnel:**

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174 Hours

120 Hours

112 Hours

8 Hours

19 Hours

132 Hours

138 Hours

**TOTAL****703 Hours****II. Trips and Conferences:** None.**III. Work Done During Period:**

During this report period, work has been continued in the following areas.

**1) Variable Reluctance Modulators**

New core materials, obtained from the [redacted] Subsection, have shown the feasibility of extending the operating range of these devices to approximately 25 Mc/sec. Present work is directed towards the location of unbalance causing an unsymmetrical modulation pattern of the balanced modulator configuration. Such unbalanced conditions can be cancelled for one carrier frequency by adjustment of the operating point of a driver transistor, but this correction does not hold over a wide frequency range. With a well balanced core, however, it should be possible to vary the carrier frequency over a wide range without affecting the modulation pattern.

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**2) Diode Amplifiers**

An investigation of various types of diode amplifier output stages was conducted during the present reporting period. A "push-pull" type circuit arrangement was demonstrated to be both feasible and practical. A six stage, direct coupled audio amplifier was constructed having an input signal level of 5 millivolts at a 20,000 ohm impedance level with approximately 2 volts

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output across a 150 ohm load resistance. A low level A-M modulator employing storage diodes was developed which has an advantage over conventional diode modulators in that the storage of carriers is utilized to produce audio power gain. The feasibility of utilizing a single transistor oscillator as the clock power supply was demonstrated in conjunction with this A-M modulator circuit.

Activity in the diode amplifier field will be continued in an attempt to develop additional circuits having practical application in radio systems.

### 3) Remote Tuning Device

One of the major troubles experienced with these devices during previous experimentation was what appeared to be contact bounce of the actuating switch. A closer study of the effect shows that apparently much of the trouble experienced is due to ringing of the quantizer core. Attempts to eliminate this by redesigning the quantizer core and windings have been made and the results of these changes are presently under investigation. If these changes show the desired results, it will improve the repeatability of frequency settings considerably. In that case the next study phase will be on the improvement of the linearity of the frequency vs. number of set pulses characteristic.

### 4) Photo-Electronic Circuits

Measurements have been taken to explore the possibility of using fast photo-conductors. The general results were not promising - the sensitivity of the PC was too low in all cases. The PC elements used were Lead Sulphide "Cetron" and "Ektron" cells and large area p-n photo-junctions (solar cells). Work has been done on the development of basic logical elements for computer circuits. This work has been directed towards obtaining the optimum speed with the available materials. Some of these circuits will be combined to form more complex logic nets, such as half-adders and shift registers. If time permits, an analysis will be made of the symmetrical bistable stage with a view to obtaining design data necessary for obtaining maximum speed of operation.

## IV. Plans for Next Month:

During the next report period, work will be continued as indicated in the foregoing paragraphs. In addition, the present series of measurement being made on "Magnistors" used as electrical tuning elements will be continued. Their frequency stability as a function of temperature is being determined. Two approaches have recently been taken in the magneto-resistive field. One has been towards the development of a contact plating technique for slabs of

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